atoms, and R^2 was a methyl group. The selected compound (*E*)-1-(2-chlorothiazol-5-ylmethyl)-3-methyl-2-nitroguanidine (code No TI-435) is now under development. TI-435 provides prominent control not only of homopterous pests but also of heteropterous, coleopterous, dipterous, thysanopterous and lepidopterous pests by foliar application, soil and treatment and seed treatment at low use rates.

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Insect-neuroactive substances in two species of the genus Liquidamber

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Abstract: Three insect-neuroactive substances from *Liquidamber styraciflua* and *L formosana* were isolated and characterized by spectral analyses as betulonic acid, 1-methoxy-9-caryolanol and eudesm-4(14)-ene-1,6-diol, respectively.

Keywords: Insect-neuroactive substances; betulonic acid; 1-methoxy-9-caryolanol; eudesm-4(14)-ene-1,6-diol; *Liquidamber styraciflua*; *Liquidamber formosana*

The plant kingdom offers numerous groups of compounds which exhibit a variety of biological activities. The diversity of complex chemical structures of such natural products is a valuable source of leads from which novel synthetic compounds can be developed. We can detect such products through screening the extracts from plants by suitable bioassays. A wide range of synthetic and natural chemicals have been shown to exert specific actions on insect tissues or nerves, and advances in methods for recording the electrical properties of insect nerves have been valuable in determining the molecular mechanisms of novel neuroactive agents including insecticides.[1]

During the course of studies on natural insect-neuroactive substances in plants, we have established a simple and sensitive bioassay for screening compounds, the layout of which is shown in Fig 1.[2] This shows the preparation of the metathoracic leg nerve of American cockroach, *Periplaneta americana* L, which involves insertion of pin electrodes into a cockroach leg. The metathoracic leg of an adult male cockroach was cut off and the cuticle removed for administration of the sample solution; the sensilla tricodia was fitted with a wire which was connected to a small speaker. The input to stimulate the motor nerve in the leg was measured as the concentration needed to stimulate the frequency of spontaneous discharges of the leg nerve cord.

Using this bioassay, the methanol extracts of various plants, including about 40 Kenyan and 15

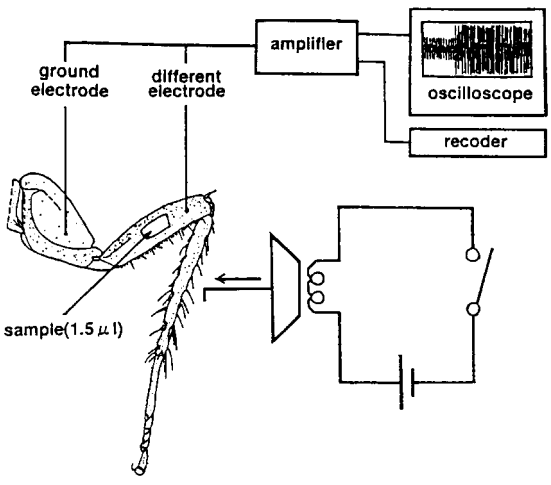

Figure 1. Bioassay method for measuring the electrical responses from the metathoracic leg nerve of *Periplaneta americana*.

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(*Received 29 June 1998; accepted 30 September 1998*)

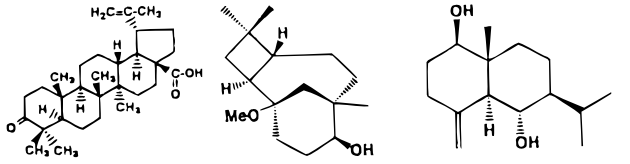

Figure 2. Structures of neuroactive substances from *Liquidamber styraciflua* and *L. formosana*.

Indonesian plants, as well as many plants collected in Japan were screened for the presence of neuroactive substances; they showed a variety of profiles of the nerve responses. Among them, *Liquidamber styraciflua* L and *L formosana* Hance were chosen for investigating the isolation of active principles in this study. This summary reports the occurrence in the immature fruits of these plants of active components which increased impulse frequency remarkably, and also the isolation and identification of such active components. The active compound **1** (20 mg) was isolated from the hexane-soluble fraction of the methanol extract of *L styraciflua* (4.4 kg) by using conventional separation methods, such as silica gel column chromatography, preparative TLC etc, to give the pure compound. Spectral analyses, as well as a literature survey and chemical synthesis from commercially available betulin, allowed identification of the active compound **1** as betulonic acid, a triterpene acid.[3]

The active compound **2** (2 mg) was obtained from the hexane-soluble fraction of the methanol extract of *L formosana* (78 kg) by similar procedures, and the active compound **3** (14 mg) from the ethyl-acetate soluble fraction of the same extract. By comparison of their UV, IR, [^{1}H] and [^{13}C] NMR and MS spectral data with those reported in the literature,[4–6] the active compounds **2** and **3** were identified as 1-methoxy-9-caryolanol and eudesm-4(14)-ene-1,6-diol, respectively, which are both sesquiterpene alcohols.

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Antifungal activity of resveratrol oligomers from *Cyphostemma crotalarioides*

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Abstract: Resveratrol and its oligomers: ε-viniferine, gnetin C, Pallidol and gnetin E, as well as three new dehydrodimers, cyphostemmines A–C, have been isolated from the roots of *Cyphostemma crotalarioides* (Ampelidaceae). Such compounds have not been reported previously in the family Ampelidaceae. *Cis* ε-viniferin has also been characterized as a minor component of the extract; it may have undergone partial transformation in solution into *trans* ε-viniferin.

Keywords: *Cyphostemma crotalarioides*; Ampelidaceae; antifungal; *Fusarium nivale*; resveratrol

1 INTRODUCTION

In our continuing search for new pesticides from plants indigenous to Sudan, we have carried out a systematic study of the secondary metabolite composition of some plants with known biological activity; some of these metabolites are already used for pest control in traditional agriculture. As part of this programme we have shown that a methanol extract of *Cyphostemma crotalarioides* (Blonch) (Ampelidaceae) exhibited interesting activity against the fungus *Fusarium nivale* Ces. Although this erect herb has been fully described in the literature,[1,2] there have been no reports of either the constituents of this plant species or of the possible biological activity of extracts of the plants. Our preliminary results have demonstrated the occurrence of resveratrol oligomers in such extracts. A number of similar oligostilbenes have been isolated from members of the Vitaceae, Cyperaceae, Dipterocarpaceae, Gnetaceae and Leguminosae, some of which exhibit interesting biological activities, especially chemopreventive, antitumoral, antifungal and antibacterial activity (see, for example, Reference 3). This summary reports the isolation and structural identification of some compounds of this type which are described for the first time in the family Ampelidaceae.

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(*Received 25 June 1998; accepted 30 September 1998*)